Professional Development Committee
Interim Agenda

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400 INTRODUCTION

The Professional Development Committee (Committee) will address the following items at the National Conference on Weights and Measures (NCMW) 2007 Interim Meeting.

Table A identifies the agenda items in the Report by Reference Key Number, Item Title, and Page Number. An item marked with an **"I"** after the reference key number is an informational item. An item marked with a **"D"** after the reference key number is a developing issue. The developing designation indicates an item has merit; however, the item was returned to the submitter for further development before any action can be taken at the national level. Table B lists the Appendices to the Agenda.

Table A
Index to Reference Key Items

Table B
Appendix

Details of All Items
(In Order by Reference Key Number)

401 EDUCATION

401-1 I National Training Program (NTP)

Source: The Committee (2003)

Background: The Board of Directors established the Committee at the 2003 NCWM Annual Meeting in Sparks, Nevada. The first critical charge given to the Committee was to develop a National Weights and Measures Professional Development Program in cooperation with its partners including:

- State and local weights and measures departments;
- Private industry at all levels; and
- Technical advisors from NIST Weights and Measures Division and Measurement Canada

NTP will address the following tasks in order of priority:

(a) The education and professional development of weights and measures officials and the promotion of uniformity and consistency in the application of weights and measures laws and regulations;
(b) The education of industry personnel with regard to weights and measures laws and regulations, including all areas from device manufacturer to service technician;
(c) Quality standards for weights and measures activities and programs;
(d) Safety awareness for weights and measures-related activities; and
(e) Development of a firm partnership with the state and local weights and measures departments, private industry at all levels, and NCWM. It is critical that NIST Weights and Measures Division (NIST WMD) partner with the Committee, and where appropriate provide technical advice. Measurement Canada is also encouraged to participate in Committee activities.

The Committee began developing the concept of a National Certification Program for weights and measures officials during the 2004 NCWM Annual Meeting. In December 2004, several Committee members met in Harrisburg, Pennsylvania, to develop further the Committee's overall strategic direction of a National Certification Program. The participants agreed that NTP should take the following directions:

(a) The training responsibility remains with the state and local jurisdictions;
(b) Administrator training must be added to the curriculum;
(c) Training and structure used by agencies outside NCWM should be explored and used as models;
(d) The Central Weights and Measures Association (CWMA) offered to assist the Committee in determining what knowledge and prerequisites are required for beginning and advanced inspectors; and
(e) The Western Weights and Measures Association (WWMA) recommended course outlines for shorter training courses.

The strategic direction is summarized in Appendix A.

Discussion:

Central Weights and Measures Association (CWMA): CWMA expresses its continued support for a viable National Training Program.

Northeastern Weights and Measures Association (NEWMA): NEWMA continues to support the proposed direction for development of the National Training Program.

Southern Weights and Measures Association (SWMA): SWMA supports the National Training Program.

Western Weights and Measures Association (WWMA): To build upon the recommendation offered by WWMA last year, which was to encourage each regional association to dedicate a portion of their annual meeting to NTP, WWMA would ask the National Professional Development Committee (PDC) to develop a mechanism to add accountability for the successful completion of NTP. This mechanism could be a simple action plan with tasks that have been either assigned or taken on by a region. Each task would be listed including a name of an individual to serve as a contact person for inquiries as to the progress of the task and a date the project will be completed.

401-2 I Create a Curriculum Plan (Carryover Item 401-4)

Source: The Committee (2003)

Background: The Committee agreed the following steps must be addressed for NTP to be viable:

(a) Develop and maintain a curriculum plan in cooperation with our partners that establishes uniform and consistent training objectives for weights and measures professionals in all fields and at all levels.

(b) Develop objectives of the curriculum plan representative of a consensus of our partners and organize those objectives by scope, sequence, and level of complexity to assist those developing the curriculum materials.

The development of a training program should follow the steps below:

(a) Study training programs of outside agencies and state and local jurisdictions.

(b) Establish knowledge goals for weights and measures officials and administrators.

(c) Develop curriculum based upon the findings and results of the steps (a) and (b) above.

(1) Coordinate the development of curriculum materials to be used in the delivery of training (i.e., lesson plans, digital presentations, slide shows, testing guides, etc.) using a variety of formats (e.g., self-study, traditional instruction).

(2) Consider creating a network of interested parties to establish priorities, share training resources, foster cooperation to reduce redundancy, and promote uniformity and consistency.

(d) Develop examinations, quizzes, or tests based on the content of the materials developed under Item (c)(1).

(e) Gather and share information from trainers on highly effective training techniques, visual aids and other materials that have been used to facilitate learning. Use as many of these resources as available.

The Committee reviewed the notes from the NIST-sponsored administrators' workshops held in Denver, Colorado, and Baltimore, Maryland, and plans to explore many of these ideas.

During the 2004 Annual Meeting, the Committee discussed the idea of using work groups to develop courses that could be used for self-study or for traditional classroom settings. The Committee agreed that the initial priority should be high profile devices (e.g., motor-fuel dispensers and retail computing scales). The Committee studied the survey results to focus on the memberships' needs and desires.

There were several recommendations submitted by the regional associations. CWMA commented that the Committee should draw upon other sources, both external and internal, for establishment of curricula. WWMA recommended the Committee review current training courses on the NIST website at http://www.nist.gov/owm to establish and identify various levels of training. They also suggested the Committee review and update all existing NIST training courses, and recommends WMD post them on the NIST website. NEWMA recommended the Committee set standards for education that include provisions for field tests.

During the 2005 Interim Meeting, recommendations were made to develop course curriculum with specific learning objectives and development of tests to determine mastery of the learning objectives. Training responsibility to meet the

objectives would rest with the jurisdictions. It was recommended that the Committee oversee development of the tests to be administered for each course. Upon successful testing, certificates would be issued. Protocol for preserving the integrity of the tests and the testing system would need to be developed.

Following the 2006 Annual Meeting, the PDC forwarded a small-scale example format developed in 2002 by the prior Administration and Public Affairs Committee (A&P) and the documents provided by New York as example formats to the regional associations. These documents have been posted to the PDC page on the NCWM website. The regional associations have begun work on their designated curriculum plans. The regional committee responsible for developing the curriculum segment is reminded to focus on a level of competency expected of the entry-level inspector. As the regions develop the curriculum, they should also begin development of the written certification questions needed to verify that the curriculum goals have been met.

Discussion:

CWMA: The PDC will assess the status of the work on small scales curriculum that New York has provided guidance on. Central Association members, Brian Heskin and Agatha Shields, have volunteered to work on the curriculum plan for retail scales, as necessary, or begin work on a package-checking curriculum if retail scales have been done. These work groups will need to be provided with a standardized format for curriculum development and provided with their final goals and objectives to ensure that end product meets the PDC's expectations. CWMA members who have a knowledge base within a specific discipline and are willing to assist in development of the curriculum and certification tests are encouraged to submit their name, area of expertise, and contact information to the NCWM PDC representatives for work group consideration.

NEWMA: Participants were advised CWMA would be developing the curriculum for Package Checking rather the Retail Motor-Fuel Dispensers (RMFD). During discussions, New York indicated it would continue to refine curriculum for small scales including sample test questions. Participants were urged to access the NCWM website to review the three existing portions of the small scales component. A request was made to develop a work group to create another draft curriculum to be provided to the PDC for comment. One item suggested was Vehicle-Tank Meters (VTM) given the Northeast's heavy reliance on home heating oil. The New York state director will contact other NEWMA state directors to elicit their support and recruit participants. If we get the right people in place, we will notify the NCWM PDC Committee.

NEWMA believes the format presented in the New York materials on small capacity scales is a good format and recommends that the NCWM PDC use this as the curriculum model for all future development and make copies available to all curriculum work groups.

SWMA: SWMA submits for consideration the curriculum for Class III and III L Scales outlined in Appendix C.

WWMA: Since the curriculum format for the core competencies has not been decided upon, WWMA is offering for consideration the Retail Motor-Fuel Dispenser Curriculum outlined in Appendix B.

401-3 D Instructor Improvement (Carryover Item 401-7)

Source: The Committee (2003)

Background: One Committee goal is to work with all interested parties to improve the competence of instructors and the uniformity of delivery of curriculum.

The Committee concluded there are two parts to the instructor improvement strategy. The first part is educating trainers in effective methods of instruction. A variety of courses and training methods are available from state, federal, and private sources to develop instructional skills and techniques. Jurisdictions are encouraged to seek out and send selected staff to participate in this type of training.

The second area of instructor improvement is to provide trainers with the knowledge of the technical aspects of all types of devices. The Committee believes that NIST WMD continued leadership and participation is a valuable asset in this area and recommends that WMD continue to provide the technical training for instructors. The Committee invites and

looks forward to working with WMD as a resource to consult with trainers and to work with the Committee to keep the curricula current as changes to the Handbooks occur, new technologies are deployed, and emerging issues develop. While this is not an urgent issue, the item will be retained as a developing item.

Industry has continued to support and sponsor training on their new technology for weighing and measuring devices. NIST has assured the committee that they will continue their work towards providing technical training for the trainers.

Discussion:

CWMA: No comments were received in open hearing on this item.

NEWMA: During discussions, participants were advised that NIST is conducting training on a by request basis and will continue to try to leverage resources to assist state and local programs in meeting training needs. A suggestion was made that field inspectors collect a variety of clip art on the many situations encountered during inspections, which would be useful in the visual part of training. These examples could be useful as part of specific core competency training.

SWMA: SWMA realizes the importance of competent instructors, and recommends the National PDC continue to develop a plan for instructor improvement.

WWMA: WWMA recommends that the National PDC make a request to NIST WMD that they reinstate the Train the Trainer program. Many of those that had completed this program have left state government or retired. Having NIST-certified trainers in specific weights and measures disciplines could be a key element in NTP.

The National Committee, while recognizing the importance of this item, has recommended that this topic be put on hold until progress is made in other areas.

401-4 D Certification (Carryover Item 401-8)

Source: The Committee (2003)

Background: The Committee believes a NCWM certification program should be developed based on a curriculum plan with measurable levels of competency.

The Committee agrees that weights and measures officials must pass written examinations to receive certification. Certificates could be presented at the Annual Meeting to administrators and weights and measures officials who complete training classes and pass the course examination. In 2004, then Chairman Dennis Ehrhart indicated the Board of Directors would consider requests to fund training. The Committee is exploring certification of weights and measures officials as a means to demonstrate competency. WWMA and CWMA submitted extensive comments and recommendations regarding this item prior to the 2004 NCWM Annual Meeting. The Committee has designated this item as developmental.

The 2005 NCWM Certification Proposal was redrafted to reflect NCWM's role in issuance of the certificates and was posted on the NCWM website.

Subsequent to the 2006 NCWM Annual Meeting, all states that had not been previously contacted were sent a letter requesting the name of their State Certification Coordinator (SCC). The state director will be deemed the default SCC in the absence of a designated contact. The list of SCC contacts is posted on the NCWM website.

Discussion:

CWMA: The CWMA W&M directors were asked if they could provide the name of their SCC to the PDC. W&M State Directors requested additional information on the responsibilities of the SCC to enable them to assign the correct person. Some jurisdictions may need to assign more then one SCC depending on the duties and responsibilities of the SCC.

NEWMA: Names of SCCs will be submitted to NEWMA PDC Chair as major points of contact in collecting and disseminating information and materials related to certification. There was discussion about the types of training necessary to obtain certification(s) and types of certification, which would be appropriate to W&M officials. This should be kept in mind as we develop the curriculum.

SWMA: SWMA supports the certification program. The SWMA PDC will forward a list of SCCs from member states to the National PDC.

WWMA: As stated previously, WWMA supports having the states meet the requirements established by NCWM. After demonstrating competency, NCWM would be the appropriate entity to issue the certificate. By exposing weights and measures inspectors to standardized training methodology, this certification process will lead to uniformity. However, we believe it is time to begin the process of building the infrastructure of the program. We must determine what the program will look like and establish the roles of the states and NCWM. It is unrealistic for NCWM to fund a complete certification program. It is critical that the states take an active role in the process if the program is to be successful. WWMA also recommends that the certification program not be limited to weights and measures personnel. NCWM certification could be offered, for a fee, to manufacturers, service companies, or individuals providing they meet the criteria set forth by PDC in NTP.

The Committee recommends a written test, and it is also considering that a field test component be added sometime in the future. Curriculum developers will need to create questions for certification as the training material is developed. Upon successful completion of the certification test, NCWM will be the issuing authority for the certificate.

To maintain testing integrity the testing protocol may need to include provisions for independent third party testing. States without the ability to have third party testing consideration should be allowed to determine how to conduct testing internally to meet the same integrity goals.

Other concerns were expressed that development of certification should be secondary to curriculum development. The Committee is seeking input as to whether NCWM members would like certificates to be issued based on individual device type or covering a broad range of devices categores.

401-5 D Recommended Topics for Conference Training (Carryover Item 401-10)

Source: The Committee (2003)

Background: Bill Sveum and Vince Orr's presentation, Net Content Control of Retail Products during Manufacturing, was added to the NCWM 2006 annual agenda as an educational session.

The Committee also continues to recommend these topics for possible training seminars, round tables, or symposia suitable for presentation at the National Conference meetings:

(a) Risk-based inspections (Robert Williams, Tennessee, volunteered to present their state's RMFD testing program),
(b) Marketplace surveys,
(c) Auditing the performance of field staff (Will Wotthlie, Maryland, volunteered to lead a session on auditing field staff),
(d) Device inspections using a sampling model, and
(e) Emerging issues.

Discussion:

CWMA: High fuel prices make cheating on quantity a lucrative business for unscrupulous station owners. Some jurisdictions have uncovered retail motor fuel fraud schemes that operate at nonstandard hours or that employ difficult to detect technology. CWMA is recommending that industry and knowledgeable jurisdictions conduct a technical/information session at the Annual Meeting to update everyone on all the known retail motor fuel fraud schemes. All jurisdictions would then have the knowledge to determine the best approach for fraud detection and deterrence.

NEWMA: No comment.

SWMA: SWMA recommends the following ideas for training: Public Relations, specifically dealing with aggressive/ angry people, and Inspector Investigative Procedures.

WWMA: WWMA would suggest that presentations of general safety issues, defensive driving, the administrative civil penalty process, price verification, and customer service be considered for training topics.

All members are encouraged to submit their ideas for topics to Committee members and to volunteer to lead, present, or moderate a topic.

The PDC continues to recommend that Maryland do a session on auditing of field staff activities and Tennessee do a presentation on their state's RMFD testing program.

The PDC is recommending that NCWM chairperson explore current motor fuel trends and technology updates as a presentation at the next Annual Meeting. Due to the high cost of petroleum products, alternative fuels are growing in popularity. States' inexperience with these products makes this a good topic to invite guest speakers to update the membership on these commodities.

Due to the importance of inspector safety, the PDC sees value in safety discussion. The committee is requesting that NCWM set aside one hour of conference time to devote to the sharing of best practice safety information or to consider a safety presentation. The PDC will provide suggested speakers.

402 PROGRAM MANAGEMENT

402-1 I Safety Awareness (Carryover Item 402-3)

Source: The Committee (2003)

Background: In the past, the Committee's responsibility extended to the identification of safety issues in the weights and measures field and included efforts to increase safety awareness.

At the 2005 Annual Meeting, Past-Chairman Dennis Ehrhart recommended the committee make training its highest priority. The Voluntary Quality Assurance Assessment program, NCWM Associate Membership Scholarships, and safety awareness efforts were carryover items from the Committee on Administration and Public Affairs (A&P) and not the new direction.

Jurisdictions should send their safety reports and issues to their regional safety liaison, who in turn will forward them to Charles Gardner, the NCWM Safety Coordinator. Charles recommends the reports or report summaries be published in the NCWM newsletter. At the 2005 Interim Meeting, a CD-ROM on safety produced for the U.S. Environmental Protection Agency was made available for review. The Committee will ensure that safety awareness is a part of every aspect of training for NCWM stakeholders.

Discussion:

CWMA: No safety reports have been submitted for a few years. The value of learning from a safety incident makes pursuing and obtaining this information worthwhile. CWMA will make the report form accessible on the website for

membership use and will work towards placing the form in the next regional publication. Since accident prevention is the main goal in obtaining safety incident information, there may be value in having jurisdictions share what they have done to prevent injuries and safety incidents. Since W&M inspectors are exposed to flammable commodities routinely, the CWMA PDC is recommending that CWMA consider providing fire safety training through a local fire department at one of its meetings. This type of training would demonstrate the proper use of a fire extinguisher and provide hands on experience in extinguishing a fire.

NEWMA: No comment**.**

SWMA: The SWMA PDC realizes the importance of safety in the workplace. SWMA encourages that all safety issues be forwarded to the Southern Safety liaison Steve Hadder, Florida Department of Agriculture.

WWMA: WWMA recommends that jurisdictions continue sending safety reports to the NCWM Safety Coordinator Charles Gardner to be summarized and included in the NCWM newsletter and archived on the NCWM website.

Many states have changed their method of approach to conducting business to accommodate safety concerns. The National PDC believes that the sharing of this information has value and suggests that one hour of conference time be devoted to the sharing of best safety practices.

402-2 I Standard Categories of Weighing and Measuring Devices (Carryover Item 402-4)

Source: Western Weights and Measures Association (WWMA) (2005)

Background: The Western Weights and Measures Association (WWMA) Administration and Public Affairs (A&P) Committee recommended that standard categories of weighing and measuring devices be adopted to facilitate development of technical standards, inspector training, data collection, and program management.

The final report of the *Survey of Inspection Statistics Collected by State Weights and Measures Programs [2002]*, conducted during mid-2003, observed the absence of standard categories for weighing and measuring devices was a serious obstacle to data collection. For example, the way weights and measures programs categorize scales by type, use, or capacity and capacity ranges often vary considerably. Retail motor-fuel dispensers are currently being counted either by dispenser, grade, or number of hoses or meters. The need for reliable weights and measures statistics is summarized in the final report conclusion as follows:

> Accurate statistics would be helpful in many ways at both the state and national level. For instance, performance measures are difficult to develop without statistics. Also, work plans require accurate and detailed statistics. In addition, budget, staffing, and other elements of each state program demand statistics on inspection workloads. Finally, neither individual states nor NCWM will be able to estimate and advertise the value of the nation's weights and measures programs unless reliable statistics are available.

To correct this problem, WWMA developed *Standard Categories for Weighing and Measuring Devices,* and recommends that standard categories for weighing and measuring devices be adopted to facilitate the development of technical standards, inspector training, inspection data collection, and weights and measures program management.

At the 2005 Interim Meeting, the Committee agreed this item should remain informational because standardized categories of weighing and measuring devices have merit, and these should be considered in the future.

Discussion:

CWMA: No comments were received in open hearings on this item.

NEWMA: One participant indicated that this item had merit in defining category breaks in scales and meters to increase uniformity. It may also serve as dividing lines when working on the curriculum and certification issues.

SWMA: SWMA supports this item.

WWMA: WWMA recommends this item be moved forward to stand or fall on its merits. This should be the first finished work product of the PDC. These standardized device categories are essential to the creation of meaningful national statistics.

WWMA drafted the following recommendation for consideration by the Committee. The standard categories of weighing and measuring devices are based on capacity ranges rather than type or use. It is assumed that the inspection test procedures for scales and meters within these capacity ranges are generally similar. Weights and measures programs can adopt the recommended standard categories without changing the manner in which they presently keep records of device inspections by simply adding an extra data field.

Two-letter device category codes could be employed to categorize devices in weights and measures jurisdictions for reporting to NCWM during annual surveys. Otherwise, the data collection procedures already in place would be unaffected. It would be helpful also to add the two-letter device category code to inspection reports.

Subsequent to the 2006 Annual Meeting, NCWM Device Category Codes were updated.

NCWM DEVICE CATEGORY CODES

DEVICE CODE	CATEGORY	CAPACITY	EXAMPLES
SP	Scale, Precision	< 5 g scale division	jewelry, prescription scales
SS	Scale, Small	< 300 lb	retail computing scales
SM	Scale, Medium	300 to 5 000 lb	dormant, platform scales
SL	Scale, Large	> 5 000 lb	livestock, recycler scales, hopper scales, belt conveyor
SV	Scale, Vehicle	>40 000 lb	vehicle, railway track scales
MS	Meter, Small	<30 gpm[1]	retail motor fuel dispensers
MM	Meter, Medium	30 to 200 gpm	vehicle-tank meters
ML	Meter, Large	>200 gpm	agri-chemical meters, bulk oil meters, loading rack meters
MF	Meter, Mass Flow	All	heated tanks of corn syrup (soft drinks)
MW	Meter, Water	All	water sub-meters for mobile homes & apartments
MG	Meter, LPG	All	propane sales
MT	Meter, Taxi	All	Taximeters
DT	Device, Timing	All	clocks in parking garages
DL	Device, Length Measuring	All	cordage meters
GM	Grain Moisture Meter	All	
GA	Grain Analyzer	All	
MD	Multiple Dimension Measuring Device	All	
MC	Meter, Cryogenic	All	

[1]Retail motor-fuel dispenser counts should be based on meters except that mid-grades should be added for blenders.

The PDC believes this item is ready to move forward as a voting item.

402-3 D PDC Publication

Source: The Committee (2005)

Many of the PDC items will continue to be carryover items from year to year. The Committee has created a PDC document archive. NCWM will maintain the archive. To eliminate the cost of reprinting the more lengthy items in their

entirety and to preserve the important aspects of the PDC work a legacy document was developed. Following the 2006 Annual Meeting these documents have been archived on the NCWM website for easy access and downloading as needed.

The initial list of PDC work and documents include:

History of PDC
Formal Scope of PDC
NCWM Board of Directors Charge to the PDC
PDC's Role in the NCWM Strategic Plan
PDC's Strategic Plan
National Training Curriculum Outline
Suggested Topics for NCWM Annual Conference
Standard Categories of Weighing and Measuring Devices
Safety Liaison Contact Information
List of State Certification Coordinators and Contacts
NCWM Issued Certification Program
Voluntary Quality Assurance Assessment Program

Discussion:

CWMA: Perhaps a PDC "handbook" for PDC committee members use should be developed. This would maintain continuity when the makeup of the committee changes.

SWMA: SWMA recommend these items be made available on the NCWM website.

WWMA: WWMA recommends the PDC utilize the newly revamped NCWM website to archive PDC carryover items in order for them to be accessible to NCWM members.

Agatha Shields, Chair, Franklin County, Ohio
Kenneth Deitzler, Pennsylvania
Ross Andersen, New York
John Sullivan, Mississippi
Tina Butcher, NIST/W&M
Michael Sarachman, Kraft Food Global, Associate Member
C. Gardner, New York, Safety Liaison
Linda Bernetich, NCWM Staff Liaison

Professional Development Committee (PDC)

Appendix A

Strategic Direction for the Professional Development Committee

The Committee developed their strategic direction to define its roles and responsibilities to NCWM and the weights and measures community. The Committee members wrote principles to guide them in their deliberations and defined four main areas to focus their efforts. The Committee recognizes that its direction and responsibilities may be changed by the Board of Directors.

The guiding principles of the group were:

- Keep things simple,
- Develop programs that are realistic and achievable,
- Minimize redundancy and administrative tasks,
- Recognize that no one size fits all, and
- Meet the needs of W&M officials, service companies, industry, and manufacturers.

The four main areas for focusing their efforts were:

National Training Program – The focus of the National Training Program (NTP) would be to increase technical knowledge, strengthen credibility, and improve the professionalism of the individual weights and measures official. A strong NTP would work to promote uniformity across the nation.

National Certification System – A national certification system would be developed to recognize or accredit weights and measures programs as competent or capable. The program would include requirements around individual training, proper test standards, use of national handbooks, and a data gathering system.

Conference Training Topics – The Committee would be the focal point for gathering and recommending workshops or symposia on leadership, management, and emerging issues to be presented during the annual conference. These topics would provide a forum for the exchange of ideas and discussion of changes in the marketplace.

Uniformity of Data – The Committee would work to develop standard categories for devices and inspection areas so that such things as the number of devices, compliance rates, frequency of inspection and other areas could be compiled and compared at the national level. These statistics could be used to benchmark organizations and to communicate the value of weights and measures to the public and to decision makers (see Item 402-4).

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Appendix B

Curriculum for Retail Motor Fuel Dispensers

Field Inspector's Guide for Determining Compliance of Basic Dispensers with National Institute of Standards and Technology Handbook 44

Retail Motor Fuel Dispensers are sophisticated measuring devices that have evolved over many years to become a convenient, reliable, and accurate means of dispensing fuel into motor vehicles.

Early dispensers were rather crude devices consisting of nothing more than a large graduated flask connected to a fuel storage tank, and a hose to transfer the fuel into a vehicle's tank. Deliveries were usually limited to ten gallons. The hose was of the "dry" type meaning it was empty at the time the fuel was measured in the flask and empty after delivery. It contributed nothing to the measurement process.

Advances in engineering produced dispensers that indicated the quantity of fuel as it was being dispensed and "wet" hoses were introduced. In this type of hose, fuel is present before, during, and after delivery. The condition of the hose and nozzle can affect accuracy. The first mechanisms were of the "clock" type and indicated quantity only. Further developments created analog indications of quantity and price of the delivery. Recent innovations have given us digital electronic indications, which prevail on nearly all equipment encountered in the modern service station.

This guide will concentrate on modern RMFD's with digital electronic indicators

Inspection and testing of a RMFD entails more than checking the device for accuracy of delivery and price charged. It involves safety of the inspector and the public, integrity of standards and equipment, and the knowledge of how to use them correctly.

This guide will help you understand the variety of items you must consider when inspecting and testing RMFD dispensers. It is not the final word on any enforcement action you might take. For that you must rely on the requirements in Handbook 44 *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices* and you own jurisdiction's laws and regulations.

Safety

Safety and safety awareness is paramount when working around RMFD's. Always remember, **SAFETY FIRST!**

Inspect your work environment for potential hazards. You don't have to be an expert in safety to be aware of conditions that could be dangerous. Generally, being safe is just a matter of common sense and doing the right thing.

Many policies and regulations will vary from jurisdiction to jurisdiction. It is essential that the inspector be aware of all safety regulations and policies in place at the inspection site and the safety policies established by the inspector's employer. The safety reminders included in this guide contain general guidelines for safety, and are useful in alerting inspectors to the importance of taking adequate precautions to avoid personal injuries. These guidelines can only be effective in mitigating safety hazards if inspectors receive training in hazard recognition and control.

NOTE: The safety reminders included in this guide are not intended to include all possible safety precautions to be taken before proceeding with the inspection of a weighing or measuring device. Information is available on various safety topics from sources such as Occupational Safety and Health Administration (OSHA) at http://www.osha.gov/.

Emergency Procedures:

Always be familiar with emergency procedures and have a plan BEFORE beginning an inspection. After an emergency has developed, crucial time can be lost if emergency procedures are not known. Be familiar with the procedures to follow in the event of a malfunction of your equipment or the device under test.

Be familiar with the nature of any product being dispensed by a device. Know the emergency procedures to follow if a spill should occur or a person has is exposed to the product. Know the location and operation of fire extinguishers and emergency shut-offs, and evacuation procedures.

It is a good idea to keep a list of emergency phone numbers handy at all times in a notebook or on a card. Examples of numbers to keep are the local fire department, emergency medical facility, and other appropriate public safety agencies.

Things to be aware of:

- Environment
- Clothing
- Equipment
- Product

Environment

Pay attention to the location where you will inspect devices. Note any potentially unsafe conditions or situations. Things to look out for include:

- **The condition of the dispenser:** Is it in good repair? Are there any loose panels, broken accessories that can snag clothing or cause bodily harm? If there are leaks or exposed wiring in or around the dispenser, advise the owner and discontinue testing until the unsafe conditions are corrected.

- **Wet or slick conditions:** Use caution when moving in wet, slippery areas. These include ice and snow, fuel spills, and rain. Wearing shoes with non-skid soles will provide traction and lessen slippage. If the conditions are excessive, take steps to mitigate the danger. Have the owner clear the area of snow and ice. Cover spilt fuel areas with absorbent material.

- **Vehicular and pedestrian traffic patterns:** Service stations have vehicles moving in and out at all times. As many an old time inspector will tell you, funnels, safety cones, five-gallon test measures, and even the inspectors themselves are magnets for moving vehicles. Whenever possible, position your vehicle beside the dispensers you are inspecting to afford you some protection from errant vehicles. Curious drivers will often get out of their vehicles and ask questions. They may distract you and cause you do something unsafe, such as spilling fuel, or tripping over the hose or your equipment. There is a potential for their injury also. Provide a safety zone by marking the test site with signs, safety cones, flags, etc.

- **Fill pipe cavities:** There comes the time when the fuel must be returned to the storage tank. This necessitates the opening of the cap to the fill pipe and creating a hole in the ground. This opening must be adequately marked with signs and or safety cones. The inspector who fails to do this puts his or her employer in litigious jeopardy.

- **Obstructions:** Take care to avoid injury from obstructions in the work area during the course of an inspection such as obstructions on the ground that an inspector might trip over to reach a device to be tested, etc.

Clothing

Determine what protective clothing or equipment you will need.

Synthetic fibers in clothing tend to build up a static charge which can be a dangerous, potential ignition source and this type of clothing should not be worn when working with flammable products. Also synthetic clothing melts at high temperatures; if the person wearing the synthetic clothing is exposed to flames, the clothing may melt and stick to the person's skin to result in severe burns.

Use caution when wearing loose clothing (or hanging jewelry) around machinery as it may become entangled and result in personal injury.

Eye Protection: Appropriate eye protection is recommended when working around hazardous products that may inadvertently splash into the eyes, and eyewash facilities should be considered. Contact lens wearers should be particularly careful to follow the instructions of their eye-care practitioner and local OSHA representative when working around hazardous products.

Personal Protection Equipment: Many types of personal protection equipment are available such as; non-synthetic clothing, coveralls, gloves, barrier creams, non-permeable safety aprons, safety sleeves, safety shoes, respirators, goggles or safety glasses, hearing protectors, and hardhats. OSHA and safety clothing and safety equipment manufacturers can provide additional information concerning the selection of personal protection equipment for a given type of inspection activity.

Safety Shoes: Safety shoes are recommended to prevent personal injury. Safety shoes provide protection from falling objects, from slippage, and static discharge. Many styles and types of safety shoes are available. The American National Standards Institute and safety-shoe manufacturers can provide additional information concerning the selection of safety shoes for different types of inspection activities.

Equipment

Be sure that test measures and other test equipment are properly maintained. Every traceable standard will have a certificate of traceability. Obtain a copy of the certificate, and carry it with the standard at all times.

For equipment powered by electricity, make sure it is equipped with an explosion proof motor. Always check the electrical supply lines on test equipment carefully for signs of wear or damage, take steps to protect these supply lines from damage during use, and correct any potentially hazardous conditions.

Grounding: Properly ground the test measure being used when inspecting meters which dispense flammable products. Be sure to connect the grounding wire or jumper cable to bare metal surfaces, not to painted or plastic surfaces.

When testing retail motor fuel dispensers, be sure to:

- Ground the nozzle against the test measure neck when dispensing product.
- Ground the neck of the test measure against the metal funnel when returning product to the storage tank.
- If a test measure is vehicle-mounted, be sure the vehicle is properly grounded.

Safety Cones/Warning Signs: Position safety warning signs or safety cones to block off the work area when the inspection site is exposed to vehicular or pedestrian traffic. When working around flammable liquids warn people of a potential hazard by posting "No Smoking" and "No Open Flame" signs.

Fire Extinguisher: When working with flammable products, make sure the extinguisher you have is **Class B,** suitable for fires involving flammable liquids. Know how to use the fire extinguisher correctly, and contact the local fire department for current information and training.

A modern service station and individual RMFD's have built-in safety features such as break-away nozzles and hoses, and a shear or fire valve that stops the flow of fuel should the dispenser be knocked over by one of those errant vehicles while it is avoiding the inspector. You should also locate the emergency shutoff switch that enables you to cut power to the dispensers in an emergency.

Although it is prudent to have a fire extinguisher within easy reach when working around flammable products, do not rely on your ability to fight a fire. You are not trained in firefighting. If the fire is small i.e., a spill of fuel ignites, you may be able to put it out, but if say the five-gallon test measure is knocked over and the fuel ignited it may be best to retire to a safe distance and call the fire department.

First Aid Kit: Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity. Similar to the fire fighting, you are not a trained paramedic – anything more than a small cut or bruise, call for emergency care. You can check with your local OSHA office or with your departmental safety officer for input on the items to be included in each kit.

Lifting: Although the use of vehicle-mounted test measures is becoming commonplace, there are occasions when you need to carry hand-held five-gallon test measures. When lifting a full test measure, there is less strain on your back to balance the load by carrying two - one in each hand. Remember though, a test measure with five gallons of gasoline weighs around 41 lb.

Transportation of Equipment: Consideration must be given to isolating the inspector from the test measures and other equipment during transportation to and from the inspection site. The inspector must be isolated from hazardous fumes; means of such isolation include, but are not limited to, vehicles outfitted with protective barriers, equipment carriers located outside of the vehicle, and vehicles with separate driver/equipment compartments, etc.

Ensure all equipment is properly secured to avoid exposing the inspector to potential flying projectiles.

Product

Nature of Product: When testing RMFD's, you will be working around many potentially hazardous products. Gasoline and gasoline blends, diesel and diesel blends are hazardous, liquids. Apart from their flammability, they have other characteristics. Obtain a copy of the Material Safety Data Sheets (MSDS's) for each product and review before testing a device. These will provide information such as physical data, fire and explosion hazard information, health hazard information, reactivity data, spill or leak procedures, special protection information, special precautions, toxicological information, and other relevant information. For further information on MSDS's, contact your local OSHA office.

Combustion: Combustion can result when fuel and oxygen are available and an ignition source is present.

Ignition Sources: There are various ignition sources. Probably the one you should be most concerned with is Static Discharge or more correctly electrostatic discharge, which occurs when an electrical charge is built up on an object and discharged when touched by another object that allows the electric charge to flow. The voltage can be anywhere from several hundred to tens of thousands of volts. The discharge is usually evident by a spark, which is the source of ignition that can cause combustion of a flammable product. Other sources include open flames or smoking, metal to metal contact which causes sparking (e.g., metal wrench or hammer on a pipe fitting), a running motor, worn or faulty electrical wiring, improper grounding, and the wearing of synthetic clothing. Because disposable lighters can spark upon impact, inspectors should avoid carrying them while testing RMFD.

ALWAYS USE A **METAL** FUNNEL TO RETURN PRODUCT TO STORAGE TANKS. NEVER USE A PLASTIC SAFETY CONE AS A FUNNEL!! Pouring product into the return fill can build up static electricity; a proper ground must be made by placing the metal neck of the test measure against the metal lip of the funnel before emptying.

Open both sides of the dispenser to allow fumes to dissipate before proceeding with the inspection of the dispenser.

Switch Loading: Do not use a test measure that has been used for drafts of gasoline to measure diesel fuel until you are certain that all gasoline vapors have dissipated. This practice, called "switch-loading" is extremely hazardous because diesel fuel is likely to produce a static charge while being dispensed. Sparks from this charge could easily ignite gasoline vapors inside the measure.

Inspection

Having determined that the location is safe, this is the point at which you begin your inspection of the device. The pre-test inspection is your opportunity to determine, amongst other things, the suitability, accessibility, position, and correct installation of the device. You will be applying both Handbook 44 (HB44) General Code and Liquid-Measuring Devices Code requirements.

You should always make a thorough visual inspection of a device; however, newly installed devices require additional scrutiny.

With a newly installed device, you must first determine if it has been approved before continuing with the inspection. For existing equipment, check to see if there are any modifications that would make the device not conform to its original approval.

Retroactive and Nonretroactive Requirements: A quick word here about the applicability of regulations, particularly when there are changes to regulations. If a regulation is not noted as being nonretroactive, then by default, it is retroactive, and the regulation applies to and is enforceable on all equipment regardless of its date of manufacture or first commercial use. If a regulation is noted as being nonretroactive, it is enforceable only on equipment manufactured or used commercially after a specific date. *(Nonretroactive requirements are printed in italic type.)*

It may be necessary, therefore, to determine the manufacture date of the equipment and/or the installation date. Handbook 44 does not have a specific requirement for placing the date on the identification (ID) plate of a device. Generally, however, manufacturers have a date code on their ID plate. You or your jurisdiction may need to get a copy of the date coding used by individual manufacturers.

Assistance: If you need special equipment, accessories, labor, etc., to test a device, the person in charge of the device is required to provide them.

Suitability: An RMFD must be suitable for the service and environment in which it is used. Essentially, this means using the device as intended and in the environment for which it was designed. A device designed and approved for use with gasoline or diesel may not be suitable for dispensing gasoline/ethanol blends or biodiesel, and if designed for indoor use, it may not be durable enough for an outdoor location.

Devices with digital indications are restricted to deliveries above 100 divisions. On the standard display of 0.001 gal, the device cannot be used to dispense less than $^{1}/_{10}$ of a gal or 23 in^3.

Installation: A dispenser must be installed in accordance with the manufacturer's instructions and its operation and performance is not adversely affected by its mounting.

An obstruction between the dispenser and its primary indicating element is not permitted unless there is a permanent, convenient means for direct communication.

An exception for motor-fuel devices used exclusively for fueling of trucks allows two delivery outlets provided deterrents are in place to restrict flow to the receiving vehicle only.

Position and Accessibility: There is a general requirement that equipment be positioned so that its indications may be accurately read and observed by the consumer and that it is accessible for both testing and for consumer use. In a modern service station, this is not something that is likely to be a problem but be aware of the requirements.

Condition of Equipment: The dispenser and all attached devices and mechanisms necessary for proper operation must be in proper operating condition. Check for things like leaking nozzles, worn or kinked hoses, loose or missing controls or buttons.

Marking: There are several required markings for a device.

Identification: Check that the device has name of the manufacturer, model number and a non-repetitive serial number.

Note: there are exceptions for equipment with no moving or electronic component parts.

Limitations: If product has a use limitation (e.g., maximum or minimum flow rate) this must be marked on the device.

Money-Operated Dispensers: If a money-operated dispenser can be activated and used by the customer and no attendant is present, the device must be marked with the name, address, and phone number of a local responsible party.

Installation: The device must be installed in such a manner that all required markings are readily observable.

Indicating and recording elements: Dispensers must have a primary display indicating quantity and may have a primary printed ticket or receipt. Deliveries are indicated in gallons with decimal subdivisions, and although indications in the metric system (Liters) are permitted, they are non-existent as are fractional subdivisions. The value of the smallest unit is 0.5 L (l pt.) or less on a RMFD

Readability: The indicating and recording elements must be appropriate in design, clear, definite, accurate, and easily read under normal operating conditions.

All operating controls, switches, lights, displays, push buttons, must be clearly identified by uses of words, symbols, or pictograms.

Unit Price: Check that the dispenser is displaying or is capable of displaying, on each face, all the prices for which the device is set to compute or dispense, and the customer can determine these, before delivery of the product.

Auxiliary Indications: If the dispenser has additional indications such as the cashier's display, ensure the auxiliary money value divisions are identical to those of the dispenser display.

Note: It is not necessary for all unit prices to be displayed simultaneously. There are exceptions for fleet sales, other price contract sales, and truck stop dispensers.

Diversion of Measured Liquid: Examine the piping of fuel from the meter. Look for any diversion of the fuel before it reaches the nozzle. Fuel, once measured, cannot be diverted from the measuring chamber or the discharge line. Two or more delivery outlets may be installed if automatic means are installed to insure that the liquid can flow from only one outlet at a time. The direction of flow is indicted conspicuously and clearly.

This restriction does not apply to truck refueling dispensers, provided the diversion to another vehicle is apparent and deterrents are in place. Deterrents include, but are not limited to, physical barriers to adjacent driveways, visible valves, or lighting systems that indicate which outlets are in operation, and explanatory signs.

Discharge Hose: As mentioned earlier hoses can be of the "wet" or "dry" type. However when a pump-discharge unit is equipped with a flexible hose it shall be of the wet-hose type (i.e., the hose must remain full of fuel up to the outlet nozzle), and be reinforced so that the performance of the device is not affected by expansion or contraction of the hose.

The length of the discharge hose in a service station is restricted to a maximum of 5.5 m (18 ft), but for marinas and airports the hose can be up to 15 m (50 ft). Longer hoses are permitted if it can be shown that a longer hose is essential for deliveries to receiving vehicles or vessels (an unnecessarily remote location is not justification).

Hoses longer than 8 m (26 ft) need to be adequately protected from weather and environmental factors when not in use.

Note: It is not necessary that you physically measure each hose; visual determination of the length is adequate in most instances. However if any enforcement action is taken measurement using a traceable measure is essential.

Vapor elimination: Dispensers are required to have means to prevent the passage of vapor and air through the meter. Early equipment, using pumps to lift fuel from storage tanks, needed air (vapor) eliminators. Almost all modern dispensers are served by submersible pumps installed in the storage tanks. Provision for air elimination is built into the discharge manifold (head) of the submerged pumping unit. Additional air elimination is not required at the dispenser.

Security Sealing Provisions: Adjustable components that affect the metrological integrity of the dispenser or any adjustable element controlling deliveries if the delivery rate affects the accuracy of the delivery must be security sealed in such a manner that adjustments are detectable. Mechanical adjustments are protected with a physical seal.

1) Note: Electronic calibration of the measuring element is becoming more common. In those cases where electronic audit trails are used, there may be no physical seal on measuring elements that are electronically calibrated.

2) Note: Information for accessing the electronic audit trail information may be obtained from the Certificate of Conformance (CC) for the device. In some cases, this information was not required on the CC and may have to be obtained from instructions provided by the manufacturer.

Product Identity: For dispensers used in direct retail sales the identity of the product must be conspicuously displayed and posted on each side the dispenser. In addition, a multi-product dispenser must also display conspicuously the grade, brand, blend, or mixture that it is set to deliver.

Product storage identification: Check that the fill connections are marked plainly and visibly as to the product contained in the tanks. Color-coding maybe used as the marking means provided the location have a conspicuously displayed color code key.

Tolerances

Now it is time to determine the tolerances you will use when testing a dispenser. As you become experienced at testing RMFDs, you will automatically know the appropriate tolerances, but it helps to know how they are determined just in case you are presented with a situation you are not familiar with, or you test using a volume other than the standard five-gallon delivery.

There are three tolerances you will apply, **acceptance, maintenance, and repeatability**.

Use Acceptance Tolerances when inspecting

1) Newly installed equipment;
2) First official test within 30 days of installation for commercial use;
3) First official test within 30 days following corrective action for performance failure;
4) First official test within 30 days following major reconditioning or overhaul; and
5) Equipment undergoing type evaluation.

Use Maintenance Tolerances for equipment in actual use, except where acceptance tolerance is applicable. This is the tolerance you will use the most.

The **acceptance tolerance** on a five gal delivery is 3 in^3 and for ten gal 5.5 in^3.

The **maintenance tolerance** on a five gal delivery is 6 in^3 and for ten gal 11 in^3.

For other test drafts, the tolerances are 0.3 % for acceptance tolerance and 0.5 % for maintenance tolerance of the delivered quantity. For example on a 15 gal draft, acceptance tolerance would be 10.3 in^3 and maintenance tolerance would be 17.3 in^3.

Application of Tolerances: These tolerances are applied to errors of under registration and errors of over registration.

Repeatability: There is also a tolerance on the **repeatability** of multiple tests. First, the results of each test must be within the applicable tolerance (acceptance or maintenance) then the range of the results must be within 40 % of the absolute value of the maintenance tolerance. So, for a five gallon test using maintenance tolerance the values would

have to be within +/- 6 in^3 for each test and must not differ from each other by more than 2.4 in^3 (6 x 0.4) and for acceptance tolerance the values would +/- 3 in^3 and within 2.4 in^3.

Set Up for Testing

Position your vehicle where it affords you the best protection from other vehicles. Ensure the brakes are set and, for a trailer, the wheels chocked. If the provers are attached to the vehicle or trailer, ensure they are grounded and level when used.

Wear appropriate personal protection equipment such as petroleum-resistant, nonskid safety shoes (to prevent possible injury from spills or slipping on slick surfaces), protective clothing, and eye protection to prevent injury from splashed product.

Ground test measure properly and only use a metal funnel when returning product to storage.

Prepare the test measure by "wetting" it down with five gal of fuel, empty using a 30 second pour and a 10 second drain period. Use this method each time the test measure is emptied. For trailer- or vehicle-mounted bottom-drain provers allow a 30 second drain.

Note: Do not use a dry test measure and add one cubic inch to gauge reading to allow for amount of liquid required to "wet" the measure.

Be aware of vehicular and pedestrian traffic when moving between dispenser and storage tanks!

Use proper lifting techniques when lifting test measure!

Be aware of and attempt to eliminate potential ignition sources in or near the inspection site!

Do not leave an activated dispenser unattended!

Testing

Now you are ready to begin the actual test of the device. The main focus will be the accuracy of delivery and repeatability of the device, but there are some other very important tests you will perform.

First, although there are many things about a RMFD for you to consider, as have already been discussed, the most important thing for the user and the customer is the accuracy of the delivery. You, the inspector, will determine that accuracy, and you will rely on the accuracy of your standards and your ability to use them. Treat your standards with care and learn how to use them correctly.

Before you begin the volume tests, here is an explanation of what is involved. For RMFD's you will conduct several "normal" and "special" tests. These tests consist of deliveries into a five gal test measure but at different flow rates as explained below.

Normal test: The normal test is one where delivery is made at the maximum discharge flow rate developed under normal conditions of installation. However, **all** flow rates down to the average of maximum and rated minimum flow rates are "normal" tests.

> Example: A dispenser has a maximum flow rate of 9 gal/min, and the flow rate at the lowest notch on the nozzle latch is 5 gal/min, the average flow rate would be 7 gal/min (9 + 5)/2 = 7.
>
> Thus, in this example, all tests at flow rates 9 to 7 gal/min are "normal."

Note: If this first test result is at or near the tolerance limit, repeat this test.

The flow rate of an RMFD is restricted to 40 L (10 gal) per minute by federal regulations. The test drafts will be drafts of one or more amounts, including a draft of at least 19 L (5 gal).

You will not encounter a high volume RMFD, but many diesel dispensers have flow rates exceeding 80 L (20 gal) per minute. For such devices, the test draft will be at least the equivalent to the amount delivered by the device in one minute at its maximum flow rate.

Repeatability: Conduct three normal tests for a check on the repeatability of the dispenser.

Special test: A special test is any test other than a normal test. This test is designed to show if there is any wear in the metering element.

You will perform this test at the slower of the following:

- 19 L (5 gal) per minute, **or**
- If the device is equipped with an automatic nozzle, the minimum discharge rate at which the device will deliver when set at its slowest setting, **or**
- The minimum discharge rate posted on the device (RMFDs typically do not have a posted minimum discharge rate).

Begin the Tests

Zero Indication: Turn on the dispenser. If there are values indicated on the dispenser these must be zeroed before the dispenser can be used. With modern dispensers, this is generally automatic, either by turning on the dispenser or by selecting a grade of fuel. The display must be obscured until zero condition is reached. Digital indications usually display 8s and then blank during the return to zero. There must be no way to start delivery until all indications are at zero. Once at zero the indications must not advance until you open the nozzle.

Normal, Special and Repeatability Tests: Conduct three normal tests (for repeatability) and a special test and record the results.

Change of Unit Price: During one of either the normal or special tests, attempt to change the unit price. This should not be possible.

Price Computation: Check that the money values computed by the device are in mathematical agreement with the price per gallon and quantity delivered and that indicated and recorded values agree. Money values must be in mathematical agreement to the nearest one cent of money value. The total sales price must be computed at the sales price for which the product is offered for sale (exclusions for fleet and contract sales and truck refueling).

Receipts: The following information for point of sales systems interfaced with retail motor-fuel dispensers is required on a receipt for products delivered by the dispenser.

(a) Total volume delivered;
(b) Unit price;
(c) Total computed price; and
(d) Product identity by name, symbol, abbreviation, or code number (nonretroactive as of January 1, 1986).

Radio Frequency and Electromagnetic Interference (RFI/EMI) test (electronic equipment only): The electronics in the dispenser may be sensitive to outside radio frequency or electromagnetic interference. RFI/EMI tests are made during NTEP evaluations of equipment; however, tests should be made at the location to determine if the equipment operation is affected by associated and non-associated equipment. Check that the dispenser is not affected when other

equipment in the area is operating. Examples: Drink coolers, automobile engines, automobile air conditioners, compressors, legal CB radios in proximity to the device(s), etc.

Check effectiveness of anti-drain means: With the dispenser off, place the nozzle in a test measure or other metal container, raise the hose above head height open the nozzle and determine if fuel leaks from the nozzle.

Note: A few drops of fuel may be contained within the nozzle spout or boot in the case of a vapor recovery nozzle.

Zero-setback interlock: After a delivery cycle has been completed, move the starting lever to a position which shuts off the dispenser (this may require placing the nozzle back in the nozzle retainer). Subsequent delivery must be prevented until the dispenser indicating and recording elements have returned to their zero position.

The system is designed such that the discharge nozzle cannot be returned to its designed hanging position (that is, any position where the tip of the nozzle is placed in its designed receptacle and the lock can be inserted) until the starting lever is in its designed shut-off position and the zero-set-back interlock has been engaged.

Note: As a reminder, some dispensers have the shut-off mechanism in the form of a flap-actuated switch inside the nozzle receptacle.

On equipment with remote pumping systems, activate one dispenser (product). Check that other dispensers, which are supplied by the same pump, are interlocked so they will not operate without activating their individual starting mechanism.

Power loss test: Caution: See note below.

Transaction information - In the event of a power loss, the information needed to complete any transaction in progress at the time of the power loss (such as quantity, unit price, or sales price) shall be determinable for at least 15 minutes at the dispenser or at the console if the console is accessible to the customer.

User information - The device memory shall retain information on the quantity of fuel dispensed and the sales price totals during power loss.

Note: Conformance to both of the above requirements is determined during type evaluation. Both requirements are difficult to check during routine inspections, and the inspector needs to be aware of the operational difficulties (business disruptions), which may be encountered if power is removed from equipment. Check your jurisdiction's policy before making field evaluations of power loss.

Security seal and Audit Trails: Apply appropriate security seals to the device(s) which pass your inspection(s). Data change audit trails are acceptable security seals for sealing certain electronic adjustable components. Note this information on the inspection report for future reference in case of complaint or fraud prevention.

Product flush: If you are testing a multi-product dispenser with a single hose and need to draw a sample for testing fuel quality (octane) during the quantity test, take the sample at the end of the normal test for each product. If you draw the sample before an accuracy test, flush a minimum of 0.3 gal of motor fuel from the dispenser before taking the octane sample. Return the flushed product to the storage tank containing the lowest octane fuel. NCWM action at the 74th Annual Meeting in 1989 addressed this item to be included in Publication 3 and the EPOs. It is not addressed in Handbook 44.

Use extreme caution when switch-loading product!

Note on your official report, the number of gallons of each product dispensed during test.

Evaluation

When you have completed testing, you can make a final assessment that the dispenser and all attached devices and mechanisms necessary for proper operation are in proper operating condition.

Review the volume test results to determine compliance with equipment maintenance and use of adjustments requirements. If you find the errors to be predominately in favor of the device user (owner), the devices are not being maintained in proper operating condition.

Whenever equipment is adjusted, the adjustments shall be made so as to bring performance errors as close to zero as practicable.

Concluding the Inspection

All fuel returned to storage and fill pipes covered.

Ensure all seals are in place, covers replaced.

All out of order tags, if any, are in place.

Discuss with the person in charge of the device any problems found during the inspection. Have them sign the completed paperwork.

Stow your equipment securely.

Isolate test equipment to avoid your exposure to hazardous fumes.

Leave site as you found it.

Second version:

Weights and Measures
Retail Motor Fuel Dispenser (RMFD) Curriculum

- State Administrative Issues
    - Completion of Administrative Forms
    - Review of Rules
- History
- Roles in Society
- Need for Weights and Measures
- System of Weights and Measures
- Weights and Measures in United States and Your State
- Metrology
- State Laws
- Relationship to National and International Weights and Measures
- Associations
    - Regional, State, Federal
- Federal Agencies

NIST Handbook 44 – Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

- Terminology
- NIST Handbook 44
- Fundamental Consideration
- Uncertainty
- Safety
- Support Equipment
- Seals
- Supports
- General Enforcement Guidelines

Measuring Devices

- Terminology
- Measuring Device Types
- Technology
- Suitability
- User Requirements
- Operation/Markings
- Tolerances for Liquid-Measuring Devices
- Basic Liquid-Measuring Device Test
- Basic Liquid-Measuring Device Inspection

Retail Motor-Fuel Dispensers

- Common Traits
- Examination Specifications
- Test Equipment
- Examination, Installation & Maintenance
- Test Specifications
- Evaluation
- Field/Practical Exercises

Appendix C

Curriculum for Class III and III L Scales
EPO 13 and 13E

INTRODUCTION

The following information is intended for Weights and Measures Officials who are already familiar with:

1. Applicable Laws and Regulations
2. Established enforcement procedures and policies
3. Organization and use of NIST Handbook 44

This information is designed to establish a list of subject areas in which an inspector should be competent before working independent of supervision. The following may be expanded to include requirements for officials who already have entry-level skills and are ready for advanced training. Any training program or final exam could be based on any one or more of these subjects.

PREREQUISITES

1. Basic Components and Operations

Learning Outcome: Upon completion of this section the participant should be able to demonstrate an understanding of the basic components and operation of Class III and III L Scales. The participant should be able to describe the operation of and locate the following components:

Mechanical – Analog Indicating (Weighbeam and Dial)

- Weighbeam
- Fractional Beam
- Trig Loop
- Poise and Poise Stop
- Pawl
- Drop and Counterpoise Weights
- Dial
- Print Mechanism
- Graduations and Indications
- Balance Indicator
- Balance Adjustment
- Load Receiving Element
- Lever System and its Protection from the Facilitation of Fraud

Electronic Digital Indicating

- Indicating Element
- Motion Detection
- Automatic Zero Mechanism
- Recording / Printing Element
- Load Cells

Components Common to Analog and Digital Scales

- Approaches
- Weigh Bridge
- Sections
- Marking Requirements
- Provision for Sealing

Resources Needed: Access to each type of device

Assessment Method: Practical work and observation by trainer.

2. Basic Definitions

Learning Outcome: Upon completion of this section, the participant should have a good understanding of the following terms:

- Absolute value
- Approval seal
- Audit trail
- Automatic zero-setting mechanism
- Axle-load scale
- Balance indicator
- Balancing mechanism
- Beam scale
- Clear interval between graduations
- Concentrated load capacity (CLC)
- Configuration parameter
- Counterbalance weight
- Counterpoise weight
- d, value scale division
- Decreasing-load test
- e, value of verification scale division
- e_{min} (minimum verification scale division
- Event counter
- Event logger
- Fractional bar
- Graduation interval
- Graduation
- Increasing-load test
- Indicating element
- Initial zero-setting mechanism
- Interval, clear, between graduations
- Load receiving element
- Load cell
- Load cell verification interval (v)
- Main-weighbeam elements
- Main bar
- Main graduation
- Manual zero-setting mechanism
- Manufactured device
- Maximum capacity

- Metrological integrity (of a device)
- Minimum capacity
- Minimum totalized load
- Minimum tolerances
- Minimum clear load
- Multi-interval scale
- Multi-revolution scale
- Multiple of a scale
- Nominal capacity
- Nominal
- Nose-iron
- Official with statuary authority
- Poise
- Radio frequency interference (RFI)
- Retroactive
- Scale division, number of (n)
- Scale section
- Section test
- Security means
- Security seal
- Semi-automatic zero-setting mechanism
- Sensitivity requirement (SR)
- Shift test
- Span
- Specification
- Strain-load test
- Tolerance
- Vehicle scale
- Verification scale division, value of (e)
- V min (minimum load cell verification interval)
- Weighbeam
- Weighing element
- Weighment
- Zero-load balance
- Zero-load balance, automatic-indicating scale
- Zero-load balance, nonautomatic-indicating scale
- Zero-load balance for a recording scale
- Zero-setting mechanism

Resources Needed: NIST HB 44, visual aides/actual devices

Assessment Method: Written exercises, oral questions and discussion

3. Professionalism

Learning Outcome: Upon completion of this section, the participant should know the expected conduct while performing their duties:

- Appropriate dress
- Appropriate credentials
- Appropriate approach to owner/manager
- Dealing with emotional, aggressive or confrontational individuals

Resources Needed: Visual aides, role play

Assessment Method: Discussion, oral question and answer

PRE-TEST DETERMINATIONS

1. Type Approval (NTEP CC)

Learning Outcome: Upon completion of this section, the participant should know the procedure to determine the NTEP status of a device and how to obtain a CC for a particular device.

- Locate CC number on device
- Verify CC number with list of NTEP devices

Resources Needed: Computer with access to NTEP website, List/database of NTEP approved devices.

Assessment Method: Written exercises

2. Application of Maintenance or Acceptance Tolerance

Learning Outcome: Upon completion of this section, the participant should be able to identify which tolerance to apply to the device in various situations

- Recently installed devices
- Devices ordered repaired
- Devices moved from other locales
- Routine test

Resources Needed: NIST HB 44

Assessment Method: Written exercises, oral questions and discussion

3. Equipment Required

Learning Outcome: Upon completion of this section, the participant should be able to identify what equipment is needed prior to arrival at test site. The participant should also be able to assess the need for special equipment and/or assistance.

- Test weights
- Safety equipment (Hard hat, glasses, steel toe boots, etc.)
- Hand tools
- Security seals and inspection stickers
- Security clearance

Resources Needed: Actual equipment

Assessment Method: Oral questions and discussion

INSPECTION

1. Suitability

Learning Outcome: Upon completion of this section, the participant should be able to take into account variables such as commodity cost, average net load, frequency of application, environmental conditions, etc.

Resources Needed: Practical examples

Assessment Method: Oral questions and discussion

2. Location/Support

Learning Outcome: Upon completion of this section, the participant should be able to evaluate factors that could influence the performance of a device.

- Lay of the land
- Proximity to scale house
- Approaches
- Security

Resources Needed: Practical examples

Assessment Method: Field observation

3. Primary Indications and Functions

Learning Outcome: Upon completion of this section, the participant should be able to evaluate value of division units, capacity indication, etc.

Resources Needed: Pictorial representations or actual devices

Assessment Method: Written exercises or field observation

4. Maintenance/Level Condition

Learning Outcome: Upon completion of this section, the participant should know the owner's responsibilities.

- Cleanliness
- Maintaining approaches
- User requirements

Resources Needed: Access to actual device(s)

Assessment Method: Practical observation

5. Marking Requirements

Learning Outcome: Upon completion of this section, the participant should be able to determine compliance with marking requirements provided in NIST Handbook 44.

- Weighing element
- Indicator
- Load cell

Resources Needed: NIST HB 44

Assessment Method: Written exercises or field observation

TESTING

Learning Outcome: Upon completion of this section, the participant should be able to competently perform the following tests:

- Increasing load test
- Test points (State Policy)
- Decreasing load test
- Shift test
- Special Tests
- Sensitivity
- Over Capacity
- RFI
- Strain load test
- Zero load test

Resources Needed: Test equipment, actual devices

Assessment Method: Practical observation, written exercises

POST-TEST PROCEDURES

1. Completing the Test Report

Learning Outcome: Upon completion of this section, the participant should be able to accurately and completely fill out the test report.

- Computer knowledge
- Legible handwriting

Resources Needed: Actual test report, computer

Assessment Method: Practical observation, written exercises

2. Sealing

Learning Outcome: Upon completion of this section, the participant should know the appropriate sealing policies.

- Locate provision for sealing
- What to do if no provision is found

Resources Needed: Sealing equipment, actual device

Assessment Method: Practical observation

3. Official Actions

Learning Outcome: Upon completion of this section, the participant should know which of the following actions to use at the completion of the test.

- Approval
- Repair Order
- Stop Use
- Condemnation

Resources Needed: Official action notices

Assessment Method: Written exercises

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